

**APPENDIX B: U.S. ARMY CORPS OF ENGINEERS:  
FLOOD HAZARD IDENTIFICATION STUDY FOR  
THE BEAR RIVER DISTRICT**



Flood Hazard Identification Study  
**Bear River Association of Governments**

**By:**  
**United States Army Corps of Engineers**  
**Utah Division of Emergency Services and Homeland Security**

**August 20, 2003**

## Introduction

The US Army Corps of Engineers Sacramento District completed this flood hazard identification study through a contract with the seven Associations of Governments. Funding was provided under the USACE Planning Assistance to States Program (Section 22). The intent of the study is to aid in detailing natural hazards associated with fluvial process for entities within each AOG currently unmapped as part of the National Flood Insurance Program or mapped as D zone areas.

## Acknowledgements

The following agencies aided in preparation, interpretation, and completion of this flood hazard investigation study.

### Utah Associations of Governments

Bear River Association of Governments

Sacramento District Corps of Engineers

Utah Division of Emergency Services and Homeland Security

## Scope of Work

This study will evaluate and identify areas with a high flood hazard and identify potential mitigation solutions. The areas evaluated in this study include the three unincorporated counties of Box Elder, Cache, and Rich. Municipalities within the three counties were studied if they met the following criteria:

1. Jurisdiction has not been mapped by FEMA,
  2. Jurisdiction mapped by FEMA as a Zone D, area of undetermined flood hazard.
- Fluvial hazards within the cities and towns of: Bear River, Deweyville, Elwood, Fielding, Garland, Howell, Plymouth, Portage, Snowville, and Tremonton were studied.

## Description of the Study Area

This study includes the northern most counties of Utah, Box Elder, Cache, and Rich counties. The three counties are contained within two major physiographic provinces the Basin and Range province with comprises the majority of western Box Elder County, and the Middle Rocky Mountain Province. Vegetation corresponds with moisture, which increases with elevation. Thus, valleys and low land areas have desert brushes and grasses, which turn to pinyon-juniper and coniferous forests as elevation increases.

Population in the Bear River Association is predominately aligned along mountain fronts near interstates, with the majority of western Box Elder County sparsely populated. The agricultural sector still plays a large part in the economy of the study area, as does Utah State University located in Logan.

With the exception of the Raft River Mountains (tributary to the Snake River), the entire study area is drained by the Bear River, into the Great Salt Lake, a remnant of ancient Lake Bonneville. Major tributaries of the Bear River include: Malad River, Sheep Creek, Saleratus Creek, The little Bear, and Blacks Fork. Outside of the 1983 flooding event damage due to flooding in the study area has been quite limited, primarily damaging crops and agricultural infrastructure.

## Discussion, Data, and Observations

Data presented in this study are from the following sources:

Box Elder County Emergency Operations Plan  
Cache County Emergency Operations Plan  
Rich County Emergency Operations Plan  
Bear River Basin: Planning for the Future December 2002  
US Army Corps of Engineers Wasatch Front and Central Utah Study July 1984 Volumes I and II  
US Army Corps of Engineers Reconnaissance Report Bear River Basin Investigation February 1989

In addition to incorporating existing studies and plans completed in the area, this flood hazard study also contains information from technical experts familiar with the study area. The mitigation projects are purely suggested actions, which based on past experience, will reduce or eliminate the identified fluvial hazard. These mitigation recommendations in no way represent the only measure to attain fluvial mitigation. In many cases the proposed or best solution is simply avoidance. This method of mitigation is implemented through the use of zoning, and represents in most cases the lowest cost mitigation measure.

#### Need For Additional Research

Additional research should be conducted resulting in better maps for communities currently mapped as a FEMA Zone D, unmapped communities, and communities with outdated Flood Insurance Rate Maps. Communities would benefit from knowing peak flows and stages on tributaries of concern.

#### Disclaimer

The information provided in this study was developed from a number of sources including:

Past USACE studies done within the region and drainage basins,  
Personal knowledge,  
Limited onsite visits,  
Map interpolations,  
Current GIS work.

Even though care was taken to ensure a measure of correctness and field checks were preformed on the information and data gathered, it is important to note this flood hazard study is presented “as is”. The United States Army Corps of Engineers, Division of Emergency Service and Homeland Security, or any other agency assisting in completion of this study cannot accept any responsibilities for errors, omissions, or accuracy. There are no warranties, which accompany this product. Users are cautioned to field verify information provided in this product before making any decisions. In no way does the mapping presented in this study take the place of a regulatory FEMA Flood Insurance Rate Map (FIRM), or replace any flood hazard identification product developed by FEMA / National Flood Insurance Program (NFIP).

#### How Communities Were Ranked

The communities within this study were ranked based on a committee’s evaluation. The evaluation committee consisted of the:  
Utah State Floodplain Program Manager  
Utah State Hazard Mitigation Officer,

Natural Hazard Mitigation Planner,  
U.S. Army Corps of Engineers,  
State Earthquake Program Manager.

This committee researched each of the twenty-nine counties and all 269 incorporated areas within the State of Utah. Each jurisdiction was assigned one of five ratings: Very High, High, Moderate, Low, or Not Rated. These ratings in no way reflect actual flood threat. The ratings were assigned based on the following variables:

Perceived flood threat based on topography, past flooding occurrences, and experience of committee members.

Participation in the National Flood Insurance Program (NFIP).

Past studies included, but not limited to, regulatory FEMA/NFIP Flood Insurance Studies (FIS), other flood studies, and reconnaissance reports.

Population growth within the jurisdiction.

If the community is mapped by FEMA/National Flood Insurance Program (NFIP), and type of map which identifies high, moderate and low flood threats

**Ratings were used to set the scope of work for each community within this study.  
Information on excluded communities was added were available.**

#### A Word about Wildfires

Almost every year several communities around the state are flooded and/or affected by post burn debris flows. Wildfire damaged watersheds have conditions which increase the potential for debris flows which may damage structures and infrastructure in the impacted area. Overall, the heightened risk associated with alluvial fans is always of concern. Post fire revegetation and stabilization efforts in many cases do not alleviate the threat due to flooding and debris flow.

#### A Word About Dams

Dams are a critical support function for water managers in the State and can also act as a flood control measure. If a dam remains stable, does not get overtopped, or is not impaired as the result of an earthquake, then, at a minimum, they do provide incidental flood control. If not then they can add to the flood threat. There are 67 dams within Bear River AOG of those 12 have received a high hazard rating by Utah Division of Water Rights Dam Safety section. The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, size, height, volume, and incremental risk/damage assessments are a variable used to assign dam safety classification. Using the hazard ratings systems developed by the State Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years.

#### **Box Elder County**

Blue Creek

Mutton Hollow Debris Basin

Three Mile Creek Debris Basin

Cutler

Mantua

Cache County

Tony Grove Lake Dam

Hyrum

Logan First Dam

Porcupine

Newton

**Rich County**

Birch Creek No. 2

Woodruff Creek

Bear Lake a prominent recreation area is near the mid-point of the Bear River.

Historically, the Bear River did not naturally flow into Bear Lake. In 1902 a predecessor of Utah Power and Light constructed inlet and outlet canals in an effort to divert Bear River Water into the lake for later release during the agricultural growing season. River modifications have created an active storage capacity of 1,452,000 acre-feet in Bear Lake and the ability to control the flow of the river.

## Box Elder County

COUNTY	CITY/TOWN	POPULATION	STATE MAP LOCATION	NFIP STATUS	THREAT (or NSFHA-eligible)
Box Elder	Unincorporated	8023		490005 - 9/1/87(L)	Bear River and Tributaries
Box Elder	Bear River City	750	B4	Not Participating	Bear River and Tributaries
Box Elder	Brigham City	17411	B4	490006 - 8/17/81	
Box Elder	Corrine	621	B4	490197 - 7/15/80(M)	
Box Elder	Deweyville	278	B4	Not Participating	Bear River and Tributaries
Box Elder	Elwood	678	B4	<b>Not Participating</b>	Bear River and Tributaries
Box Elder	Fielding	448	B4	<b>Not Participating</b>	Bear River and Tributaries
Box Elder	<b>Garland</b>	1943	B4	<b>Not Participating</b>	Bear River and Tributaries
Box Elder	Honeyville	1214	B4	490008 - 7/29/80(M)	
Box Elder	Howell	221	B4	Not Participating	NSFHA-Eligible
Box Elder	Mantua	791	C4	490009 - 7/8/80(M)	
Box Elder	Perry	2383	C4	490010 - 5/20/80(M)	
Box Elder	Plymouth	328	C4	Not Participating	Bear River and Tributaries
Box Elder	<b>Portage</b>	257	B4	<b>Not Participating</b>	Bear River and Tributaries
Box Elder	<b>Snowville</b>	177	B3	<b>Not Participating</b>	Deep Creek Tributaries
Box Elder	<b>Tremonton</b>	5592	B4	<b>Not Participating</b>	Bear River and Tributaries
Box Elder	Willard	1630	C4	490011A - 7/1/87(L)	

\* D = Detailed Study Report and Map Prepared.

## Box Elder County Flood and Dam failure History

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flood	August 6, 1947	Brigham City	Limited damage	



Box Elder		Willard	to fruit orchards and US 91	
Flood Box Elder	May 17, 1949	Perry	50 farms damaged, several thousand dollars in damage to farms, orchards, and roads.	Source Mt. Baldy area
Flood Box Elder	August 10, 1952	Willard	\$100,000 in damage to orchards due to hail, US 91 covered with mud	
Flood Box Elder	June 14, 1960	Brigham City	Crop damage	Heavy rains large hail.
Flood Box Elder	August 8, 1968	Howell	Flooding and damage to farmland	Source Blue Creek
Flood Box Elder	June 24, 1969	Brigham City	Business establishments flooded on Main Street.	
Flood Box Elder	Spring 1983	Brigham City,	Basement damage, foundation walls, and homes. Waste treatment plant in Box Elder Creek threatened.	Total PA requests of \$146,596 for Box Elder County. Ground water and many slides.
		Garland	Dike along river eroded and floodwaters damaged community water supply pump house.	Source Bear River
		Honeyville	High ground water causing flooding	
		Willard	Several homes were inundated	Source Willard and Facer Creeks.
Flood Box Elder	Spring 1984	Entire County	Overland flows carried debris onto private	Damage total \$331,442.00

			lands, and filled Willard, Facer, and Barker Debris Basins. Flows eroded pavement, washed out road shoulders, and culverts.	
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(All dollar values given are for year of disaster)

## Unincorporated Box Elder County

### Box Elder County Flood Mitigation Goals - Goal 1 Reduce Risk of Potential Flooding

**Unincorporated Box Elder County – Problem Identification:** This county has just under 20 percent of its residents living in the unincorporated county – many in the areas surrounding Brigham City and Tremonton. Box Elder also appears to be the county with the smallest percentage of communities participating in the NFIP – most likely because the flood threats are, for the most part, only minor to moderate - several being NSFHA-Eligible. The Bear and Malad Rivers and their tributaries represent the major flood threats to development.

**Objective:** Minimize future flood damage in the unincorporated County

**Action:** Nonstructural measures appear to be the most prudent option for the county to implement in the unincorporated areas. Zoning to prevent development of structures near all rivers, creeks, and lakes would be prudent (100 ft minimum setback; greater adjacent to the Bear River) as well as not allowing development on alluvial fans. New development near canals should also be discouraged, as there have been several potentially deadly flood events in the state due to flooding caused by canal failures. The cost of modifying county laws to include these is minimal and the benefits substantial (although there will be a small percentage of the population that will oppose any zoning or other changes in the laws for that matter).

**Timeframe:**

**Funding:**

**Estimated Cost:** Minimal.

**Staff:**

**Bear River City – Problem Identification:** This community does not participate in the NFIP. As its name implies, the Bear River runs through it – posing a significant flood threat. A tributary to the Malad River also runs along the west side of the community.

**Objective:** Minimize future flood damage in Bear River City.

**Alternative Action:** Given the relatively few number of existing structures, flood proofing may be a viable alternative – especially for those structures with a history of being flooded.

**Timeframe:**

**Funding:**

**Estimated Cost:** \$10k - \$30k for the average home to flood proof.

**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** minimal.

**Staff:**

**Deweyville – Problem Identification:** This small community does not participate in the NFIP. It is at risk from flooding of not only the Bear River (the bank is apparently the town boundary) but also from not less than half dozen east side drainages. Most of the community appears to be at risk but the developed areas appear to be most threatened by the east side drainages as there is apparently little development near the Bear River.

**Objective:** Minimize future flood damage in Deweyville.

**Alternative Action:** Given the relatively few number of existing structures, flood proofing may be a viable alternative – especially for those structures with a history of being flooded.

**Timeframe:**

**Funding:**

**Estimated Cost:** \$10k - \$30k for the average home to flood proof.

**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** minimal.

**Staff:**

**Elwood – Problem Identification:** This community does not participate in the NFIP. As with Bear River City, it faces a significant threat from the Bear River on the east and the Malad River on the west. Much of the original development appears to be sited along Highway 191, approximately the same distance away from the two rivers making relatively safe from the flood threat of either. New development; however, has come increasingly closer to both rivers, increasing the overall flood threat.

**Objective:** Minimize future flood damage in Elwood.

**Alternative Action:** Given the relatively few number of existing structures at risk, flood proofing may be a viable alternative – especially for those structures with a history of being flooded.

**Timeframe:**

**Funding:**

**Estimated Cost:** \$10k - \$30k for the average home to flood proof.

**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** minimal.

**Staff:**

**Fielding – Problem Identification:** Northeast of Garland, this community does not participate in the NFIP. However, it appears that it is far enough away and high enough above the Bear and Malad Rivers to be NSFHA-Eligible.

**Objective:** Minimize future flood damage in Fielding.

**Action:** Identify Fielding as a NSFHA-eligible community (pending evaluation of flood history and evidence of past flooding).

**Timeframe:**

**Funding:**

**Estimated Cost:** Minimal

**Staff:**

**Garland – Problem Identification:** Just north of Tremonton, Garland does not participate in the NFIP. As there are apparently no rivers, creeks, or streams running through the town, it appears to have little flood threat and would be NSFHA-Eligible.

**Objective:** Minimize future flood damage in Garland.

**Action:** Identify Garland as a NSFHA-eligible community (pending evaluation of flood history and evidence of past flooding).

**Timeframe:**

**Funding:**

**Estimated Cost:** Minimal

**Staff:**

**Howell – Problem Identification:** This small community does not participate in the NFIP. It does not appear to have a significant flood threat due in large measure to the upstream Blue Creek Reservoir. Therefore, Howell appears to be a NSFHA-Eligible community.

**Objective:** Minimize future flood damage in Howell.

**Action:** Identify Howell as a NSFHA-eligible community (pending evaluation of flood history and evidence of past flooding).

**Timeframe:**

**Funding:**

**Estimated Cost:** Minimal

**Staff:**

**Plymouth – Problem Identification:** This community does not participate in the NFIP. Most of the town appears vulnerable to flooding from the 2 rather large drainages to the northeast whose creeks pass through town.

**Objective:** Minimize future flood damage in Plymouth.

**Alternative Action:** One project that would reduce the existing flood threat would be an overflow channel along the east-west road (about ½ mile north of town) from Bishop Canyon, picking up the other two drainages, then under Highway 191 to the drainage adjacent to the city cemetery (which drains to the Bear River).

**Timeframe:**

**Funding:**

**Estimated Cost:** About \$200k for excavation and culverts (assuming the road itself (and the culverts through it) do not need modification.

**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** minimal.

**Staff:**

**Portage – Problem Identification:** This community does not participate in the NFIP. It is primarily threatened from 2 creeks to the west – Portage Canyon and an unnamed drainage to the north. The main Portage Canyon channel appears to skirt the town to the southwest while the unnamed drainage does a very similar thing on the northwest. The residual threat to developments in Portage appears to be very minimal.

**Objective:** Minimize future flood damage in Portage.

**Action:** Since the flood threat for this community is so minor, A potential project could consist of zoning of the flood prone areas to insure that all new developments are sited as

far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** minimal.

**Staff:**

**Snowville – Problem Identification:** This the smallest incorporated community in the county with under 200 residents. It does not participate in the NFIP. There appears to be a substantial threat to most all the community from several relatively large Deep Creek tributary drainages to the east. (Rose Ranch Reservoir is downstream of the community so it cannot provide flood protection.)

**Objective:** Minimize future flood damage in Snowville.

**Alternative Action:** Given the relatively few number of existing structures at risk, flood proofing may be a viable alternative – especially for those structures with a history of being flooded.

**Timeframe:**

**Funding:**

**Estimated Cost:** \$10k - \$30k for the average home to flood proof.

**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** minimal.

**Staff:**

**Tremonton – Problem Identification:** Although Tremonton is the second largest community in Box Elder County; it does not participate in the NFIP. There is; however, a significant flood threat from the Malad River that flows right through the east side of town. The limited detail floodplains identified on the adjacent county map reflect what should be considered a minimal flood hazard area. In all likelihood, actual flooding would be much greater than that shown on the limited detail map. Original development in Tremonton seems to be sited a reasonable distance away from the river. It appears however, that newer development is encroaching into the floodplain.

**Objective:** Minimize future flood damage in Tremonton.

**Alternative Action:** Given the relatively few number of existing structures at risk, flood proofing may be a viable alternative – especially for those structures with a history of being flooded.

**Timeframe:**

**Funding:**

**Estimated Cost:** \$10k - \$30k for the average home to flood proof.

**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** minimal.

**Staff:**

## Cache County

COUNTY	CITY/TOWN	POPULATION	STATE MAP LOCATION	NFIP STATUS	THREAT (or NSFHA-eligible)
Cache	Unincorporated	5766		490012 - 2/1/87(L)	Bear River and Tributaries
Cache	Amalga	427	B4	490013 - NITP	
Cache	Clarkston	688	B4	490014 - 8/19/80(M)	
Cache	Cornish	259	B4	Not Participating	Bear River and Tributaries
Cache	Hyde Park	2955	B5	490016 - 7/29/80(M)	
Cache	Hyrum	6316	B5	490017 - 4/8/80(M)	
Cache	Lewiston	1877	B5	490018 - 7/29/80(M)	
Cache	Logan	42670	B5	490019 - 9/28/84	
Cache	Mendon	898	B4	490020 - 7/22/80(M)	
Cache	Millville	1507	B5	490021 - 10/22/76	
Cache	Newton	699	B4	490022 - 7/22/80(M)	
Cache	Nibley	2045	B5	490023A - NITP	
Cache	North Logan	6163	B5	490024 - 3/18/86(M)	
Cache	Paradise	759	B5	490025 - NITP	
Cache	Providence	4377	B5	490226 - (NSFHA)	
Cache	Richmond	2051	B5	4900027 - 8/12/80(M)	
Cache	River Heights	1496	B5	Not Participating	<b>NSFHA-eligible</b>
Cache	Smithfield	7261	B5	490029 - 3/18/86(M)	
Cache	<b>Trenton</b>	449	B4	Not Participating	Bear River & Ransom Hollow
Cache	Wellsville	2728	B4	490031 - 7/29/80(M)	

\* D = Detailed Study Report and Map Prepared.



## Cache County Flood and Dam failure History

<b>Hazards</b>	<b>Date</b>	<b>Location</b>	<b>Critical Facility or Area Impacted</b>	<b>Comments</b>
Flood Cache	May 30, 1958	Logan	Damage to crops due to hail and high winds. Water caused road damage	
Flood Cache	August 22, 1958	Clarkston	Limited damage to homes. Highways and roads covered with water	
Flood Cache	August 18, 1959	Providence	Dozens of homes damaged. Flooding caused rock and mudslides in Logan Canyon	
Flood Cache	June 6, 1964	Smithfield	Intense storm flooded a number of homes within town.	Source Summit Creek

(All dollar values given are for year of disaster)

### Unincorporated Cache County

#### Cache County Flood Mitigation Goals - Goal 1 Reduce Risk of Potential Flooding

**Unincorporated Cache County – Problem Identification:** Only 6 percent of the county's population is in the unincorporated county, primarily in the Cache Valley surrounding Logan. Clearly, the major flood threat is to those properties adjacent to the Bear River and its tributaries. Reservoirs include Hyrum and Newton.

**Objective:** Minimize future flood damage in the unincorporated County.

**Action:** Nonstructural measures appear to be the most prudent option for the county to implement in the unincorporated areas. Zoning to prevent development of structures near all rivers, creeks, and lakes would be prudent (100 ft minimum setback; greater adjacent to the Bear River) as well as not allowing development on alluvial fans. New development near canals should also be discouraged,

as there have been several potentially deadly flood events in the state due to flooding caused by canal failures. The cost of modifying county laws to include these is minimal and the benefits substantial (although there will be a small percentage of the population that will oppose any zoning or other changes in the laws for that matter).

**Timeframe:**

**Funding:**

**Estimated Cost:** Minimal.

**Staff:**

**Cornish – Problem Identification:** Cornish lies in northwest Cache County just south of the Idaho border. It is the smallest community in Cache County and does not participate in the NFIP. It appears that there is a moderate flood threat to the low-lying areas on the east side of town adjacent to the Bear River. There is a lesser threat from the drainages coming out of the hills west of town, which are blocked by the north-south West Cache Canal.

**Objective:** Minimize future flood damage in Cornish.

**Alternative Action:** Given the relatively few number of existing structures at risk, flood proofing may be a viable alternative – especially for those structures with a history of being flooded.

**Timeframe:**

**Funding:**

**Estimated Cost:** \$10k - \$30k for the average home to flood proof.

**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** Minimal.

**Staff:**

**River Heights – Problem Identification:** This community, just south of Logan, does not participate in the NFIP. It appears that although the northern boundary is adjacent to the Logan River, the community is on a bluff overlooking the river. The only potential threats are from Dry Canyon to the northeast and from the unnamed drainages east of town. (The City of Logan has constructed a detention basin on Dry Canyon - east of River Heights). Based on the topographic map, it appears that the unnamed drainages some distance east of town, would tend to flow southwest toward the Spring Creek drainage south of River Heights proper. Based on the incorporated boundary on the county NFIP map, River Heights appears to be a NSFHA-Eligible community.

**Objective:** Minimize future flood damage in River Heights.

**Action:** Identify River Heights as a NSFHA-eligible community (pending evaluation of flood history and evidence of past flooding).

**Timeframe:**  
**Funding:**  
**Estimated Cost:** Minimal  
**Staff:**

**Trenton – Problem Identification:** This community does not participate in the NFIP. It appears vulnerable to flooding on the east side of town from the Bear River and to a lesser extent from Ransom Hollow Creek through town (because it is a hollow).

**Objective:** Minimize future flood damage in Trenton.

**Alternative Action:** Given the relatively few number of existing structures at risk, flood proofing may be a viable alternative – especially for those structures with a history of being flooded.

**Timeframe:**  
**Funding:**  
**Estimated Cost:** \$10k - \$30k for the average home to flood proof.  
**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**  
**Funding:**  
**Estimated Cost:** minimal.  
**Staff:**

## Rich County

COUNTY	CITY/TOWN	POPULATION	STATE MAP LOCATION	NFIP STATUS	THREAT (or NSFHA-eligible)
Rich	Unincorporated	739		Not Participating	
Rich	Garden City	357	B5	<b>Not Participating</b>	
Rich	Laketown	188	B5	490099 - (NSFHA)	
Rich	Randolph	483	B6	<b>Not Participating</b>	
Rich	Woodruff	194	C6	490101 - 7/22/80(M)	

### Rich County Flood and Dam failure History

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flood Rich Presidential	Spring 1983	Randolph and Woodruff	Damage to roads, culverts, bridges, basements, and farmlands.	Source Bear Lake, Dean Ditch, and Woodruff Creek, PA cost \$37,161

(All dollar values given are for year of disaster)

## Unincorporated Rich County

### Rich County Flood Mitigation Goals - Goal 1 Reduce Risk of Potential Flooding

**Unincorporated Rich County – Problem Identification:** As one of the smallest counties in terms of population, Rich County does not participate in the NFIP. Although over 1/3 of the county's population is in the unincorporated county, primarily in the areas adjacent to Garden City and Laketown on Bear Lake. Clearly, the major flood threat in the unincorporated county is to those properties adjacent to the Bear River and Bear Lake. Less significant threats also exist along Woodruff and other smaller creeks throughout the county. Bear Lake is by far the largest water body in the county.

**Objective:** Minimize future flood damage in the unincorporated County.

**Action:** Nonstructural measures appear to be the most prudent option for the county to implement in the unincorporated areas. Zoning to prevent development of structures near all rivers, creeks, and lakes would be prudent (100 ft minimum setback; greater adjacent to the Bear River) as well as not allowing development on alluvial fans. New development near canals should also be discouraged,

as there have been several potentially deadly flood events in the state due to flooding caused by canal failures. The cost of modifying county laws to include these is minimal and the benefits substantial (although there will be a small percentage of the population that will oppose any zoning or other changes in the laws for that matter).

**Timeframe:**

**Funding:**

**Estimated Cost:** Minimal.

**Staff:**

**Garden City – Problem Identification:** This community does not participate in the NFIP. The major flood threat to this community is from Garden City Canyon and to a lesser extent, the drainages to the south and north.

**Objective:** Minimize future flood damage in Garden City.

**Alternative Action:** A structural mitigation project for this community could be a deflector levee on the west side of town near the city limit – a distance of about 8,000 ft.

**Timeframe:**

**Funding:**

**Estimated Cost:** The preliminary cost for the levee project would be about \$400,000.

**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** minimal.

**Staff:**

**Randolph – Problem Identification:** The largest community in Rich County, it does not participate in the NFIP. The main flood threat appears to be from Little Creek and adjacent drainages to the west. Based on the topographic map, there is a reservoir about 2 miles west of Randolph on Little Creek that could provide some incidental flood protection.

**Objective:** Minimize future flood damage in Randolph.

**Alternative Action:** A structural mitigation project for this community could be an overflow channel on the north side of town near the city limit – a distance of about a mile.

**Timeframe:**

**Funding:**

**Estimated Cost:** The preliminary cost for the levee project would be about \$250k to \$500k depending on the channel and culvert sizes.

**Staff:**

**Alternative Action:** An alternate project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**

**Funding:**

**Estimated Cost:** minimal.

**Staff:**